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DEPARTMENT OF THE AIR FORCE
WASHINGTON

OFFICE OF THE ASSISTANT SECRETARY

January 3, 1966

MEMORANDUM FOR: Chairman, United States Intelligence Board

SUBJECT: Reconnaissance Resources for Crisis Management Situations

REFERENCE: USIB-D-41.15/72

In the referenced document, the United States Intelligence Board requested that the National Reconnaissance Office advise the Board as soon as practicable [redacted] of its studies toward increasingly advantageous [redacted] capabilities and plans for speeding up processing [redacted] handling. This request was pointed toward meeting the needs of the United States Government in critical international situations.

In responding to this request, the NRO is doing so in the light of the framework in which the subject of crisis management has been cast in previous Board discussions--namely, periods of international tension of some duration during which photographic reconnaissance might provide information of critical importance for policy decisions.

Over the past six months, several informal discussions on this subject have taken place between the NRO Staff and the COMOR. As a result, the NRO has evaluated all reconnaissance assets available now and in the near future which might be employed for crisis management purposes. Attached is a paper which briefly summarizes the characteristics, limitations, and program status of all satellite, aircraft, and drone reconnaissance systems in this category.

With regard to satellites, except for the use of CORONA (KH-4) as a means of providing coverage of those indications targets which do not require higher resolution, near-term prospects are not good. The [redacted]

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OXCART/IDEALIST [redacted] CORONA

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The KH-4 program, because of its maturity, is in a much better position to be employed in crisis situations. Approximately six reserve systems, at 38 or less days from launch, are always on hand and could be launched in a two-month period; one system is always available at R -9, even on the launch day of another system. As a matter of interest to the Board, in conjunction with a regular launch in the next few months, I plan to test the reaction capability of the KH-4 and the processing/production facilities in a simulated crisis situation. Unfortunately, as noted previously, the resolution of the KH-4 is not adequate to provide a majority of the information needed.

I am sure the Board will agree that it and the NRO should together insure that plans are in effect to take maximum advantage of [redacted] KH-4 capabilities. The COMOR has provided targeting for the use [redacted] crisis situations and I am advised that these targets [redacted] constantly under review in order to advise the NRO of any change. I am also advised that COMOR is indicating which of these targets might usefully be covered by the KH-4 if the situation demanded that [redacted] the KH-4 [redacted] used [redacted] to collect information at a given point in [redacted]

With regard to aircraft systems, the Board is well aware of the uses which could be made of the U-2 and the BLUE SPRINGS drones in crisis situations, particularly in those areas where present air defense capabilities permit. The OXCART aircraft will shortly be available for emergency situations which might arise in China and Southeast Asia. However, the use of the OXCART over the USSR when it achieves full operational capabilities poses certain problems, not so much in terms of its ability to survive, but rather in terms of its political impact. In some circumstances its use might exacerbate unpredictably the tense situation pertaining at a time of international crisis.

In addition, there is the SAC version of the OXCART, namely, the SR-71, which will shortly become an available national asset.

There are two other photographic assets under development which would be of importance in covering crisis situations in certain areas, particularly, China and Southeast Asia. I refer to the TAGBOARD drone which will operate at high altitudes at Mach 3.3, with a range of 3,000 miles. This vehicle, which is launched from a modified OXCART aircraft, should be operational by late CY 1966. The Department of Defense is also purchasing advanced subsonic drones known as the 147-H which will be available by mid-1966, and is contemplating an even more advanced subsonic drone for use in CY 1968.

The NRO has under active study and feasibility investigation [redacted] is a part of the NRP. Also, as a means of reducing the time of receipt of information after photography has been collected, the NRO is investigating the feasibility of installing an in-flight processing and exploitation capability in a KC-135 aircraft. This would permit a saving of many hours after the retrieval of either a manned aircraft or a satellite photographic package.

In summary, in consideration of the foregoing and the attachment, several points seem clear. Neither the existing satellite, aircraft, or drone systems nor those currently in development have the desired truly quick-reaction capability to deal properly with rapidly changing international situations. Aside from considerations of quick reaction, no single system available or contemplated is capable of doing the total crisis management task. Collectively, there is a substantial national collection capability on hand and/or projected for the near term which could be employed in an emergency.

The NRO will continue to improve the capabilities of all systems for use in crisis situations, including the reduction of time from retrieval of aircraft and satellite product to delivery of findings to national authorities. Additionally, greater emphasis will be placed on investigations leading toward quicker reacting photographic satellite systems [redacted]

[redacted]
Director
National Reconnaissance Office

Attachment
Assets for Crisis Management

cc: Ch/COMOR

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ASSETS FOR CRISIS MANAGEMENT

SATELLITE SYSTEMS:

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CONTROL SYSTEM

OXCART/IDEALIST [redacted] CORONA

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Where KH-4 resolution is adequate to provide the desired information, the CORONA program is in an excellent position to respond to crisis management requirements. Approximately 5-6 systems are continually maintained at R-38, or less, days from launch. One CORONA system is always maintained at an R-7 to R-9 status, even on the launch date of another CORONA. In an emergency, it is estimated that CORONA systems could be maintained on orbit for approximately 60 consecutive days (barring catastrophic failures during launch or shortly after injection into orbit), returning a "bucket" of film each five days.

On the debit side in a crisis management role, the CORONA has several characteristics which limit or hinder its effectiveness. These limitations, plus plans to improve system capabilities, are:

1. The present J-1 CORONA provides about 10 foot resolution at nadir, varying occasionally in consistency. With the introduction of the J-3 model in early 1967, the KH-4 is expected to be more consistent (less random vibration-induced smear), and to have the capability to provide 8 foot resolution by orbiting at lower altitudes (perigee at approximately 80 miles which is not possible with the present KH-4).

2. The present CORONA can be held at R-1 for approximately 7 days; however, by preparing two systems simultaneously and recycling their count-downs in a complementary fashion an almost continuous R-1 capability can be maintained.

3. A completely new orbit and camera program can be placed in the CORONA system at R-9. There are no plans to improve on this capability since major development efforts would be involved.

4. At the present time, CORONA camera program options for each revolution are preset in the vehicle prior to launch; then, when on orbit, any one of ten alternative operations for each revolution

may be selected by the NRO. A more flexible camera programmer which permits additional alternatives will be available in 1967.

[redacted]

A significant limitation on the use of photographic systems is, of course, cloud cover (the Sino-Soviet Bloc averages approximately 60-65 percent cloud cover the year around). Another limitation is the need to return film to earth for processing prior to interpretation. The NRO has been investigating both radar and read-out photographic satellite systems for some time (experimental satellites of both have been flown). Although no specific systems are under development, or have been selected for development, for either category at this time, it should be assumed such systems will be operational by the end of this decade or in the early 1970's. More limited read-out capability could be made available by late 1968.

AIRCRAFT SYSTEMS:

Depending on the area to be covered, the U-2 (IDEALIST) aircraft has considerable potential as a crisis management system. It is basically a simple airplane system and easy to maintain. It can be kept on ready alert for extended time periods; and when in this posture, a mission launch can take place approximately 2-1/2 hours after receipt of a directive. The flight path is completely flexible and repeated coverage of a small area can be made on a single flight. The normal camera system can photograph over 36, [redacted] ver, this reduces the total area covered. Nominal 3,000 mile range of the U-2 can be extended by in-flight refueling. Two of the aircraft have been modified to operate from aircraft carriers to increase mission flexibility.

The disadvantage of the U-2 lies generally in the aircraft's vulnerability to the increased air defense capability. The IDEALIST aircraft flies sufficiently high (above 70,000 feet) to minimize the interceptor aircraft threat, but is vulnerable to SA-2 missile systems. Electronic countermeasures equipments for protection against both the aircraft and missile threats are installed. While these equipments enhance U-2 survivability, they are not completely effective. Thus, some constraints must be imposed in selecting flight paths in heavily defended target areas.

At the present time, there are twenty U-2 aircraft which could be used in crisis management situations. Nine of these are assigned to CIA, eleven to SAC. The SAC aircraft have slightly less capability in operational altitude and in electronic equipment; however, a modification program is under way to up-grade these aircraft so that all twenty U-2 aircraft will have like configuration for world-wide employment.

The A-12 (OXCART) aircraft offers a high potential for crisis management. This aircraft is in the final stage of test and development, with operational utilization scheduled for early 1966. The reaction time for the A-12 aircraft is not as fast as that of the U-2. As with the U-2, the OXCART flight paths which can be selected are highly flexible although less adaptable to last minute and/or in-flight changes. Flight paths will normally be pre-selected and programmed in the aircraft guidance computer. The high speed of the aircraft does not permit a wide range of in-flight pilot options in target selection, and changes will be made more on the basis of external advice rather than on pilot observations.

Ground target resolution o[redacted]s been obtained with two of the camera systems. A third [redacted], still in development, will produce resolutions of less tha[redacted]The aircraft will fly above 80,000 feet at Mach 3.1 and [redacted] range of slightly less than 3,000 nautical miles. In-flight refueling provides flexible mission planning and range extension for increased target coverage.

The A-12 is equipped with modern electronic countermeasures equipments and techniques. The aircraft design concept included minimizing the aircraft radar return cross-section. The combination of minimum radar return, high altitude high speed performance, and sophisticated ECM equipment makes the aircraft relatively invulnerable to the presently known Sino-Soviet anti-aircraft defenses.

There are eight A-12 aircraft in the operational configuration. In addition, two aircraft are being used for continued testing and one two-seat version is being used for training. These latter three are not readily adaptable to operational missions. There are no plans to buy additional OXCART aircraft.

The SR-71 reconnaissance aircraft is an outgrowth of the OXCART development program. Although somewhat larger, its performance is very similar to that of the A-12, and the advantages and disadvantages to be applied to operational utilization in crisis management situations are the same. The SR-71 payloads, however, are quite different. The SR-71 has three camera systems -- all carried simultaneously. Large area coverage, high resolution photography, and cartographic information can be obtained on a single mission. In addition, the SR-71 has a side-looking radar photographic system for use during all-weather conditions. This aircraft has a broadband ELINT collection capability for Electronics Order of Battle reconnaissance.

SAC will receive twenty-five operational SR-71 aircraft. Six additional aircraft have been manufactured for the test program. Delivery of the first operational aircraft to Beale Air Force Base, California, is scheduled for January 1966. A limited operational capability will be available by May 1966 and a full capability by October 1966. No additional buys of SR-71 aircraft are anticipated at this time.

DRONE SYSTEMS:

In addition to the aircraft programs, there are two drone programs which could be used for crisis management. The 147 series drones have been employed in operational missions since August 1964. The present drone (147-G) cruises at 450 knots at approximately 65,000 feet and has a range capability of 1000 miles. The camera system produces resolutions of approximately three feet; ground coverage is 320 linear miles with a 20 mile swath width. Like conventional aircraft, the drone has the flexibility of mission route selection and the capability for rapid reaction to launch. Only a few hours are required to program the guidance computer.

The main disadvantages of the drone are the inability to alter the pre-programmed flight path, the restricted total photographic coverage, and the drone vulnerability. The flight path could be controlled manually by the DC-130 launch aircraft, but this technique would jeopardize the "mother ship" in most areas of operation. The technique could be used in an area such as Cuba where the launch aircraft could "stand off" while controlling the drone or pass control to another DC-130 on the other side of the island.

Vulnerability of the drone in heavily defended areas is a problem -- it is vulnerable to both MIG's and surface-to-air (SA-2) missiles. However, the small size of the drone makes it a difficult radar target and ground controlled positioning of the interceptor aircraft for a zoom climb maneuver is quite difficult. Most losses to MIG aircraft are believed to have occurred as a result of visual acquisition due to the tell-tale condensation trail. A contrail suppression system will be installed in all drones beginning early in 1968.

To increase operational capability, a new model (147-H) is under development. This new version will fly approximately 3,000 feet higher than the present G model and will have double the photographic coverage capability (20 miles by 700 miles). To increase mission flexibility, a helicopter air retrieval system will be used with the 147-H drone. For higher resolution photographic coverage of critical targets and for coverage below cloud decks, eleven drones are being modified for both high- and low- level operations.

Twenty-six 147-G drones were purchased. Four have been lost on operational missions. Twelve low-level drones were ordered; one has been lost on a test mission. Thirty-eight 147-H drones have been ordered. Attrition of these is expected by the second quarter of 1967. A study is in progress to determine the size of the increased 147-H production requirement.

In addition to the presently available and planned drones, a new subsonic drone will be developed. This drone (nicknamed LONE EAGLE) will be available for operational use in March 1967. It will be able to fly at 75,000 feet (beyond the reach of present MIG aircraft), have a range of 1800 miles, and a new camera system designed to provide one foot ground target resolution. In addition, the drone will be designed and shaped to minimize the radar return and thus decrease its vulnerability to SA-2 missiles.

Also under development is a supersonic drone, the D-21 (TAGBOARD) aircraft. This vehicle will cruise at approximately 85-90,000 feet, at a speed of Mach 3.3 and have a range of 3,000 miles. The camera system will be capable of coverage along the entire route, with a swath width of 28 nautical miles, and a ground resolution of 1.5 feet. The drone will be launched at 75,000 feet and Mach 3.2 from a modified A-12. This system offers the flexibility of multiple entry points to the denied areas, restricted only by the range limitations of the "carrier" aircraft.

The large radius of turn (dictated by the high speed of the drone), the lack of capability to alter the flight path enroute, and a slower reaction time are the primary disadvantages of this drone. There is no known anti-aircraft defensive system capable of intercepting the drone. An anti-missile system may have the capability at some future date to react in time to accomplish an intercept.

The TAGBOARD system is presently in development. We anticipate the first test and development launch to occur in January 1966. Six TAGBOARD's have been purchased for the test program. Fourteen have been ordered for operational use. An additional purchase will be contingent upon the development success and operational utilization.

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FILM PROCESSING/PRODUCTION:

NRP film processing facilities are located at Rochester, Westover AFB, Yokota AFB, Taiwan and Saigon. Occasionally, other DOD facilities are utilized, and in an emergency, many are available for use. Thus, ample processing/production capability is available for satellite, aircraft, and drone products.

A serious limitation on the ability to react quickly in a crisis situation is the time involved in carrying the film to a processing facility and thence to Washington for interpretation and evaluation. For example, satellite capsules are recovered in the Hawaii area. Under favorable conditions, approximately 34 hours are required to deliver the film to Rochester (via McGuire AFB), develop, produce minimum duplicates, and deliver to Washington. In an emergency, film could be delivered direct to Rochester, and the Photo Interpreters could begin reviewing it at Rochester as soon as it was developed. Using this technique, initial interpretation could commence approximately 18 hours after capsule recovery.

The NRO has considered establishing a national-level processing/production facility in the Hawaii area for quick-reaction handling of satellite products. The quickest possible means of handlin [redacted]
Delete This CORONA products would be to both process and interpret in the Hawaii area and transmit the analyses to Washington.

However, believing that national authorities will desire to view the product directly, the NRO has also considered modifications to this approach. One technique might be to process and minimum-duplicate in Hawaii (would require approximately eight hours after capsule recovery), as indicated above, and airlift the take to Washington in a special C-135 or C-141, equipped with exploitation equipment and carrying a team of photo interpreters. During the 8-9 hours flight to Washington, the photo interpreters could accomplish a reasonably comprehensive analysis of the critical targets covered.

The most promising approach (for the relatively near term) appears to be a combination of in-flight processing, limited duplication, and initial interpretation in a single aircraft. Research and development is underway on the critical elements of an in-flight processor of acceptable quality. If these investigations prove out the feasibility of an all-viscous airborne processor, it is anticipated that development of two airborne processing/interpretation facilities (modified KC-135's) will be undertaken near the end of CY 66. This concept envisages the delivery of processed satellite film, along with initial interpretation, to Washington approximately nine hours after capsule recovery in the Hawaii area. When used for aircraft or drone photographic product, it would be possible to deliver processed film, along with initial interpretation, to Washington from any point on the world in approximately 20 hours or less.

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